Total Environmental Restoration Contract

New England Division

SUPPLEMENTAL UNDERWATER ARCHEOLOGICAL INVESTIGATIONS AT TWO REMOTE SENSING TARGETS NEW BEDFORD HARBOR SUPERFUND SITE
Bristol County, Massachusetts

March 2001

USACE Contract No. DACW33-94-D-0002

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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TASK ORDER NO. 017
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Bristol County, Massachusetts

March 2001

Prepared for

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and

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ABSTRACT

This report describes the results of supplemental underwater archeological investigations at two previously identified remote-sensing targets in New Bedford Harbor. Tasks performed included: development of a dive safety work plan; target specific magnetometer surveys to re-acquire and refine the boundaries of the two magnetic anomalies; and a diving investigation to identify the nature of the material that generated the magnetic anomalies. The purpose of these investigations was to identify the sources of the two remote sensing signatures and evaluate each according to criteria established for inclusion in the National Register of Historic Places. Divers found modern debris-related objects at each of the target locations. No additional underwater archeological investigation is recommended at either target location.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PLATES

1.0 INTRODUCTION

1.1 Site/Project Location

The New Bedford Harbor Superfund Site (the site) is located in Bristol County, Massachusetts. It extends from the shallow northern reaches of the Acushnet River estuary south through the commercial port of New Bedford Harbor and adjacent areas of Buzzards Bay. The harbor is flanked by the City of New Bedford on the west and the Town of Fairhaven on the east. The main portion of the harbor, the area between the Route 6 bridge and the hurricane barrier (see Figure 1-1), is naturally deep and is the home for one of the largest commercial fishing fleets in the country. In addition to the commercial fishing vessels, hundreds of recreational sail and powerboats are berthed and moored at marinas and in the various coves that are located across New Bedford Harbor. The sediments in the harbor are contaminated with high concentrations of many pollutants, notably PCBs and heavy metals from the industrial and urban development surrounding the harbor.

The site has been divided into three areas - Upper, Middle, and Outer Harbor - based on geographical features and levels of contamination (see Figure 1-1). The Upper Harbor extends from an area slightly north of the Wood Street Bridge to the Coggeshall Street Bridge. The Middle Harbor extends from Coggeshall Street Bridge to the Route 6 bridge. The Outer Harbor is the area between the hurricane barrier and an imaginary line drawn from Rock Point southwesterly to Negro Ledge and then southwesterly to Mishaum Point.

1.2 Project Background Information

From the 1940s into approximately the 1970s, two electrical capacitor manufacturing plants in the New Bedford area discharged PCB waste either directly into the harbor or indirectly through discharges to the city's sewerage system. In the mid-1970s, as a result of EPA sampling, PCBs were identified in the sediments and the seafood in the New Bedford Harbor area. In 1979, the Massachusetts Department of Public Health issued regulations prohibiting fishing and lobstering throughout the site due to high levels of PCB contamination ranging from below detection limits to higher than 100,000 parts per million (ppm) in various parts of the harbor. The site was included on the Superfund National Priorities List (NPL) in September 1983. EPA's site-specific investigations were initiated in 1983-1984, and included engineering feasibility studies of alternative dredging methods and disposal of contaminated sediments, pilot dredging and disposal studies to field test different dredging and disposal technologies for the contaminated sediments, and extensive physical and chemical computer modeling of the site.

The EPA and USACE entered into an Inter-Agency Agreement in February 1998 that gives the USACE responsibility to provide technical assistance to EPA on New Bedford Harbor. In October 1998, EPA authorized the USACE to perform remedial design activities associated with the Upper and Lower New Bedford Harbor cleanup.

1.3 Project Description

In September 1998, after years of study, public debate, and consensus building, EPA selected a cleanup remedy for the entire Upper and Lower Harbor areas as a solution to the widespread PCB

contamination in New Bedford Harbor. The remedy involves the dredging of about 170 acres and containment of approximately 450,000 cubic yards (cy) of PCB contaminated sediment in Confined Disposal Facilities (CDFs). In the Upper Harbor north of Coggeshall Street, sediments with PCB concentrations above 10 ppm will be dredged, and in the Lower Harbor and in salt marshes, sediments above 50 ppm will be dredged. Intertidal sediments in specific areas adjacent to homes and in areas prone to beachcombing will be removed if PCB levels are above 1 and 25 ppm, respectively.

Dredged sediments will be removed from the harbor and pumped to four CDFs to be constructed along the New Bedford Harbor shoreline. The CDFs will be used to permanently isolate the sediments from the public and the marine environment. The limits of the project areas and the approximate locations of the four CDFs are shown in Figure 1-2. Note that wetland areas subject to beachcombing and areas adjacent to residential areas that may require remediation have not been identified for the Lower Harbor. No dredging is presently planned for the portion of the Lower Harbor south of the Route 6 bridge and north of the hurricane barrier. Each of the CDFs will be capped following the completion of dredging operations and an appropriate period for sediment consolidation.

1.4 The Cultural Resources Program

The USACE has tasked its contractor, Foster Wheeler Environmental Corporation (Foster Wheeler), with a number of pre-engineering and engineering design tasks required to implement the selected cleanup remedy. As per 40 CFR 300.400e, Foster Wheeler is not required to obtain permits and/or waivers from federal, state, or local regulatory agencies for on-site environmental activities associated with EPA's remedial action at the New Bedford Harbor Superfund Site. However, as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), EPA, USACE, and their contractors must address and comply with Applicable or Relevant and Appropriate Requirements (ARARs) including the National Historic Preservation Act (NHPA).

Foster Wheeler has contracted with John Milner Associates, Inc. (JMA) to provide assistance and support in collecting, interpreting, and analyzing information about cultural resources which can, in turn, be used by EPA and USACE to satisfy those agencies' obligations under Section 106 of the National Historic Preservation Act. JMA is being assisted by Dolan Research, Inc. in the area of underwater archeological research (including interpretation and analysis of remote-sensing data) and maritime history. JMA and Dolan Research are also being assisted by CR Environmental (CR). CR, as a subcontractor to JMA, was responsible for providing and operating vessels. Dolan was responsible for providing the majority of remote sensing equipment used during the cultural resources program.

On July 21, 1999 personnel from JMA, Foster Wheeler, Dolan Research and USACE met with staff representatives of the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (MBUAR) to discuss various aspects of the project. Topics covered included permitting of proposed upland and underwater archeological investigations, proposed scopes of work, and the definition of an Area of Potential Effect (APE) for the project. The investigations reported here were conducted in accordance with Excavation Permit 00-001 issued by the MBUAR on May 25, 2000.

Dredging of the New Bedford Harbor has the potential to impact submerged cultural resources. In conjunction with clean-up of the New Bedford Harbor Superfund Site (the site), a comprehensive remote sensing survey was conducted across various portions of the harbor that are scheduled to be dredged (Cox 2001). During the survey phase of the project, the site was divided into three areas - Upper, Middle, and Outer Harbor - based on geographical features and levels of contamination. The Upper Harbor extends from an area slightly north of the Wood Street Bridge to the Coggeshall Street Bridge. The Middle Harbor extends from Coggeshall Street Bridge to the Route 6 Bridge. The Outer Harbor is the area between the hurricane barrier and an imaginary line drawn from Rock Point southwesterly to Negro Ledge and then southwesterly to Mishaum Point.

1.5 The Supplemental Underwater Archeological Investigation

The remote sensing survey identified sixty (60) remote sensing targets (Cox 2001). Of that number, 10 targets were found in the Outer Harbor, 27 targets in Middle Harbor, and 23 targets in Upper Harbor. Two magnetic targets, both in the Middle Harbor Area, generated remote sensing signatures that are suggestive of submerged cultural resources. Additional underwater archeological investigation was recommended at these High Probability target locations.

Both targets were located in the Middle Harbor area (Figure 1-3).

Target #	**Coordinates** (MA. NAD 83)
27:196	**E** 814,617
	N 2,697,643
66:161	**E** 815,602
	N 2,696,988

The goals of the supplemental investigations reported here were to identify the source of the two remote sensing anomalies and evaluate the potential National Register of Historic Places (NRHP) eligibility of the object(s)/material responsible for generating the target signatures and assess the need for, and type of, future additional underwater archeological investigations that might be required. In order to fully evaluate each target's historical and archaeological significance, or to establish its lack of significance, the underwater archaeological investigation was designed to collect more detailed information on the integrity, condition, boundaries and size, structural components, function and context of the target sources. Field data documenting each site's respective integrity, qualities, associations, and characteristics, was used to confirm or refute National Register eligibility requirements.

A six-person crew, comprised of two members each from Dolan Research, S.T. Hudson Engineers (who provided additional dive support), and CR Environmental, successfully completed all fieldwork activities associated with the project in New Bedford Harbor, on November 11, 2000.

2.0 METHODS

2.1 Dive Safety Plan

Prior to initiating any fieldwork activities, a comprehensive Diving Safety Plan and the Dolan Research, Inc. Safety Manual were be submitted for review to Foster-Wheeler and the U.S. Army Corps of Engineers, New England District . Mr. George Norton, USACE Dive Safety Officer reviewed and approved the Dive Safety Plan (Appendix 1). Several key issues were discussed in the Dive Safety Plan, including; the general operating procedures on site, an analysis of potential hazardous activities anticipated with diving in the New Bedford Harbor vicinity, and most importantly, an accident management plan. The Dive Safety Plan outlined all dive and safety procedures and included a list of regional and national emergency facilities to be contacted in the event of a diving or marine accident.

The Dive Safety Plan was developed according to standards required in the U.S. Army Corps of Engineers Safety and Health Requirements Manual (Section 30). It addressed the issue of minimizing personnel contact with contaminated sediments and described methods for decontaminating work all work gear. In addition, the Dive Safety Plan included a discussion of plans for reducing/preventing the re-suspension of contaminated sediments.

2.2 Relocation of Targets

All diving field operations were conducted from CR Environmental's 32-foot aluminum workboat, CYPRINODON (Plate 1). CR Environmental provided the boat captain and a mate to assist in field operations. The dive team was comprised of Lee Cox and Wes Hall (Dolan Research) and Mark Klein and Paul Kelley (S.T. Hudson Engineers).

The first work task was to relocate and refine both target locations using magnetic remote sensing equipment. Magnetic data was used to delineate the center of each anomaly in addition to the determining the extent and orientation of the site. To accomplish this goal, coordinates for the two target sites were entered into the onboard survey computer. A 200-foot square area was surveyed around each target location. A series of closely spaced (30-foot intervals) survey lanes were completed in a grid-like fashion over the target location.

A *Geometrics* G-881 marine cesium magnetometer, capable of +/- 1/100 gamma resolution, was employed to collect magnetic remote sensing data. The sensor for the magnetometer was towed 50 feet behind the survey vessel to allow optimum data collection in a shallow water environment. A one-second sampling rate by the magnetometer's towed sensor, coupled with a four-knot vessel speed, assured a magnetic sample every five feet.

Massachusetts State Plane Coordinates (NAD 83) for each target location were entered into the survey computer to facilitate the relocation of each site. Survey vessel trackline control and position fixing were provided by a differential global positioning system (DGPS) that was interfaced with the remote sensing equipment. A PC-based software *(Hypack)* package was used in conjunction with DGPS onboard the survey vessel. The onboard computer was interfaced with the DGPS satellite positioning system. Latitude/longitude positioning data from the DGPS were converted by the onboard computer to Massachusetts State Plane X,Y coordinates in real

time. These X,Y coordinates were used to guide the survey vessel precisely along predetermined tracklines that were established in a grid-like pattern at both target locations. While surveying, vessel positions were continually updated on the computer monitor to assist the vessel operator, and the processed X,Y data were continually logged on computer disk for post processing and plotting. Once the boundaries of the target signatures were identified, a series of buoys were then placed to guide divers according to signature characteristics.

2.3 Dive Operations

The primary task was to conduct diving operations at each target location. The goals of the diving activities were twofold:

1) To locate and identify the source of each remote sensing target, and;

2) Where appropriate, to record sufficient information on each site to support a recommendation regarding the eligibility of the site in accordance with Section Two of *National Register Bulletin 20: Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places.*

Diving operations were conducted jointly with divers from S.T. Hudson Engineers, an engineering firm from Camden, New Jersey. S.T. Hudson Engineers provided all surface-supply diving equipment including; two Superlite 17b surface-supplied diving helmets, two high pressure (HP) 300 cubic foot air bottles with independent high volume regulators connected to a HP air manifold with Pneumo gauge, two 150-foot diving umbilicals, a two-way hard wire surface to diver communications radio and two 30 cubic foot bail out bottle w/ scuba regulator. The divers were outfitted with Viking HD vulcanized rubber dry suits with gloves and a Superlite-17b neck sealed collar and each also had a 30 cubic foot bail-out bottle with a scuba regulator (Plates 2 and 3).

All diving was conducted with a system that included tethered surfaced-supplied air with hard wire voice communications. The operation consisted of a four-man dive team: diver, standby diver, tender and dive supervisor. The dive supervisor directed all aspects of dive operations and safety procedures. Throughout each target investigation, a standby diver was suited up and equipment ready.

After anchoring directly over the remote sensing target location, a weighted down line was established off the stern of the CYPRINODON. After entering the water via a five-step ladder at the stern of the CYPRINODON, the diver descended on the downline to the bottom to begin archaeological work. At the completion of each dive, the diver returned to the surface via the downline and exited the water by same ladder.

Divers then systematically searched the target locations in a series of circle searches until contact was established with the target source. To locate sub-bottom components potentially hidden by bottom sediment, the diver was equipped with a four-foot long aluminum probe. Once the initial reconnaissance was finished, divers were prepared to record such sites using standard underwater archaeological mapping techniques. Once the target was contacted in the sub-bottom, divers completed a systemic series of probes in a grid-like fashion to gather more data on the orientation, depth, size, and composition of the target source.

After each target was identified, an assessment was made regarding its significance. In the event the material at the site proved to be modern debris, a simple description of the site was prepared. Otherwise, divers were prepared to produce two- and three-dimensional underwater site maps at potentially significant sites.

2.4 Findings

Both remote sensing targets were successfully relocated utilizing magnetic remote sensing equipment. Water visibility was good, with diver reporting five to seven feet of visibility on the bottom. However, neither of the two targets investigated were considered to be historically or archaeologically significant. Modern debris and a mooring anchor were found at the target locations.

No additional underwater archaeological investigations are recommended for either of the two target locations. Following is a list of the findings at each target location.

Target 27:196

Remote sensing data at the target site revealed that much of the magnetic signature at the target location was related to vessels moored at the Melville Shipyard. Water depth at the target site was 13 feet (near low tide). Divers working at the center of the target found debris-related ferrous material. Using a four-foot probe the diver identified an abundance of modern large link chain and one-inch diameter wire rope buried just below the bottom surface. Divers followed the chain and wire rope for more than 75 feet on the bottom. Several sweeps across a 75-foot diameter area failed to record any additional contacts.

The site was not considered to be historically significant and no additional archaeological investigation is recommended at this target site.

Target 66:161

Remote sensing data at the target site confirmed the presence of a concentrated magnetic anomaly that featured some associated noise that extended out in a linear orientation away from the center of the target. Water depth at the target site was seven feet (near low tide). Divers working at the center of the target found the tip of the fluke of a large anchor extending above the bottom surface. The majority of the anchor was buried. Using a four-foot probe the diver followed the anchor for approximately five feet, until it became too deeply buried in the bottom for contact. The diver identified modern, one-inch diameter wire rope that appeared to be attached to the anchor. Several sweeps across a 75-foot diameter area failed to record any additional contacts. It appears that the target source was some type of mooring anchor.

The site was not considered to be historically significant and no additional archaeological investigation is recommended at this target site.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Supplemental underwater archaeological investigations were conducted at two high probability magnetic remote sensing target sites (27:196 & 66:161) that had been previously identified in the Middle Harbor Survey Area at the New Bedford Harbor Superfund Site (Cox 2001). These two targets were selected for additional archaeological investigation and evaluation according to a number of criteria relating primarily to their potential historical significance.

Both of the targets investigated proved to be associated with some type of modern debris. Divers identified wire rope and chain at Target 27:196. At Target 66:161, divers found the remains of a large mooring anchor and associated wire rope. Detailed and systematic probes were conducted at both target sites but divers failed to identify any additional sub-bottom cultural material. In the opinion of Dolan Research and JMA, material found at the two target sites does not satisfy National Register of Historic Places eligibility criteria.

No additional underwater archaeological investigation is recommended at these target locations.

4.0 REFERENCES

Cox, J. Lee, Jr.
2001 New Bedford Harbor Superfund Site, New Bedford, Massachusetts, Underwater Archeological Remote Sensing Survey. Report prepared for Foster Wheeler Environmental Corporation and the U.S. Army Corps of Engineers, New England District.

FIGURES

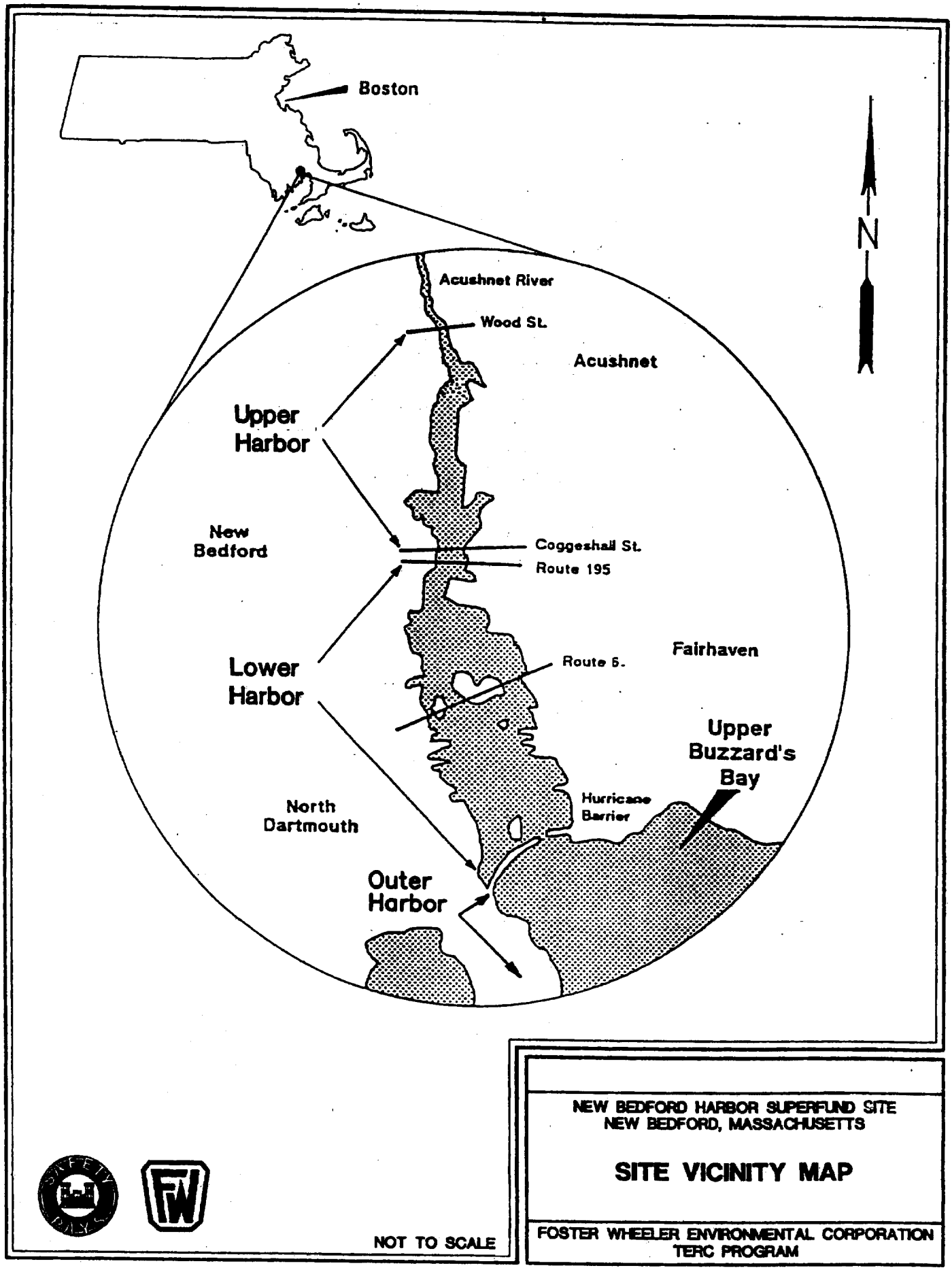

Figure 1-1. Site Vicinity Map.

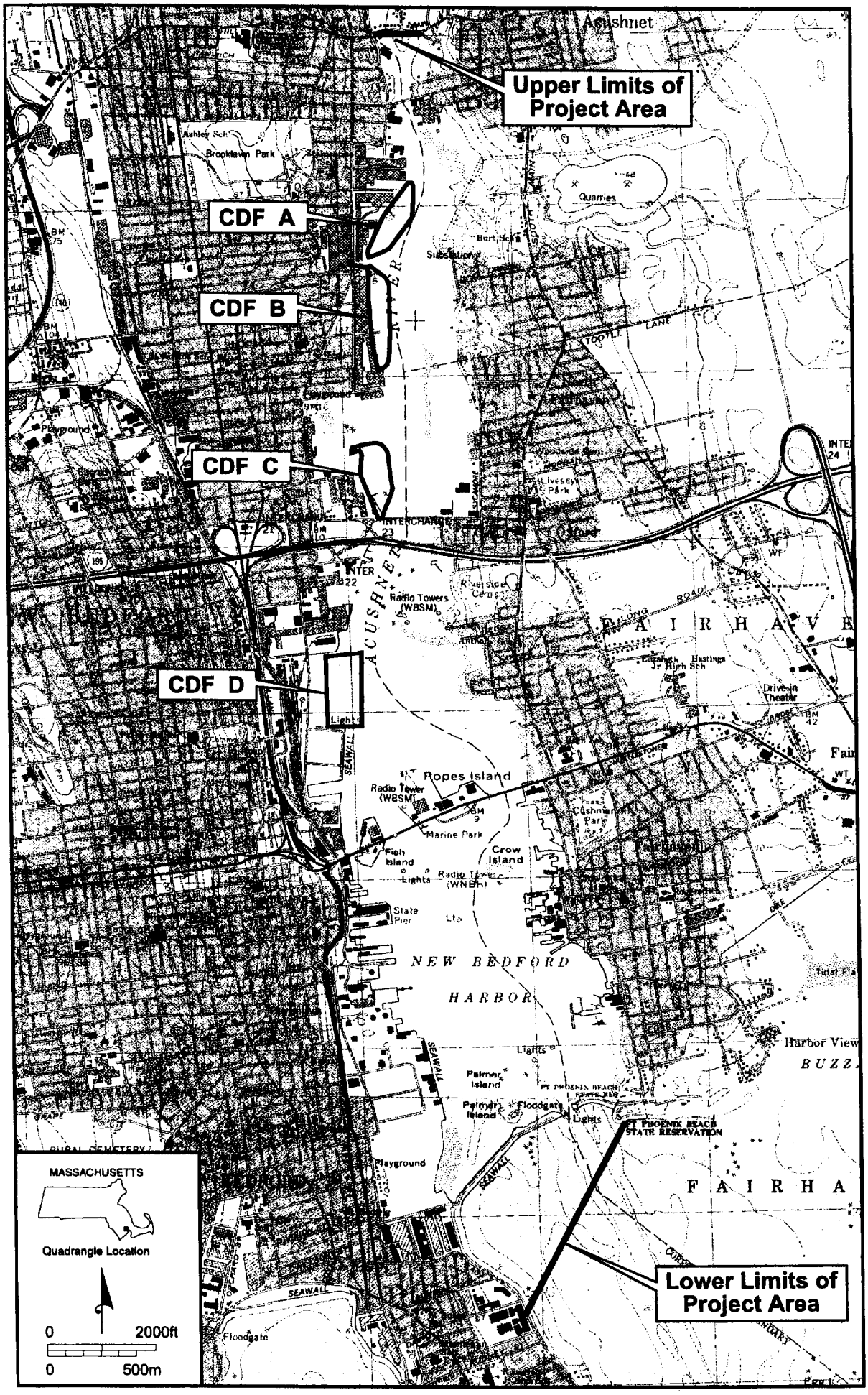

Figure 1-2. Locations of Proposed CDFs and Limits of Proposed Dredging.

Location of High-Probability
Remote Sensing Targets
New Bedford Harbor
NOAA Chart 13229, Acushnet River, MA

FIGURE NO.
1-3

PLATES

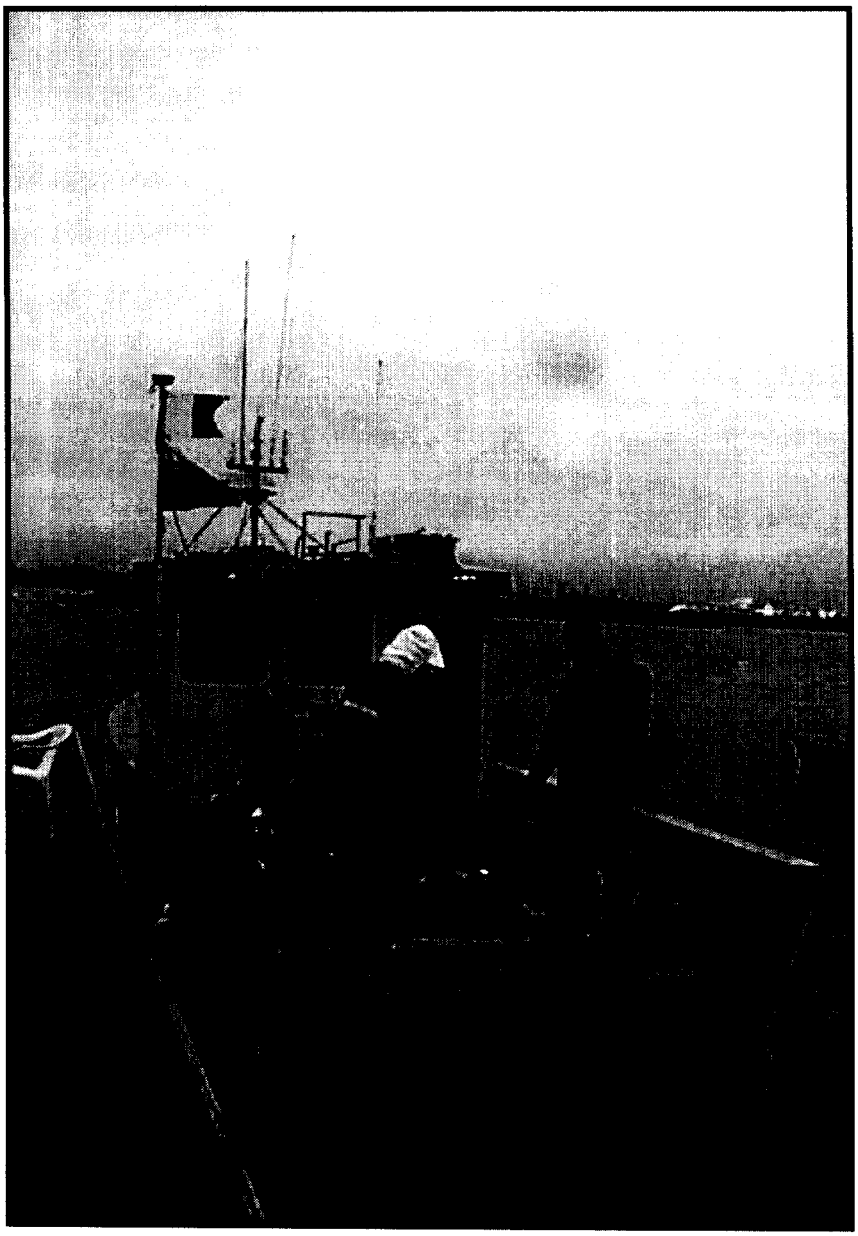

Plate 1. Work Vessel. CR Environmental's 32-foot aluminum workboat, CYPRINODON
(Photographer: Chip Ryther, 11/2000)

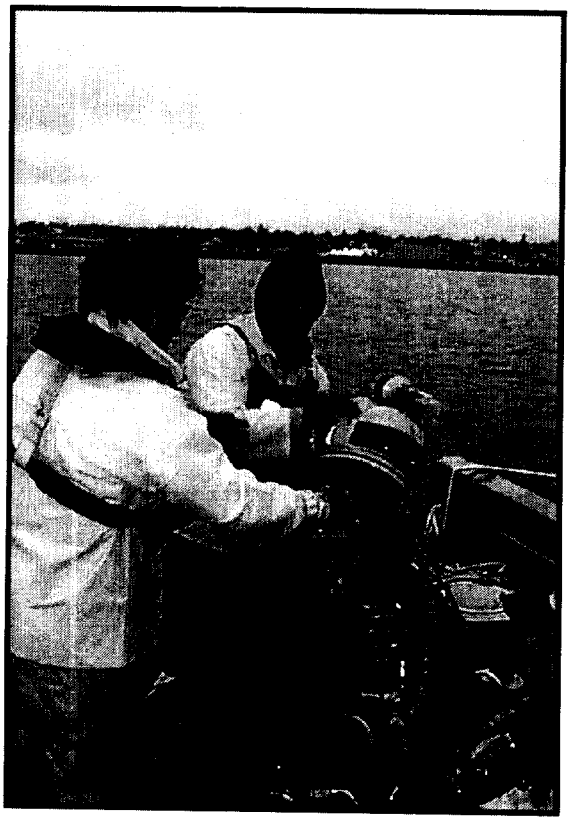

Plate 2. Tenders assisting diver prepare for target investigation
(Photographer: Chip Ryther, 11/2000)

Plate 3. Diver descending dive ladder with tender handling his umbilical hose
(Photographer: Chip Ryther, 11/2000)

APPENDIX I

U.S. ARMY CORPS OF ENGINEERS – NEW ENGLAND DISTRICT

DIVE SAFETY PLAN

FOR

Phase Ib Field Testing and Evaluation of Two Remote Sensing Targets, Acushnet River, New Bedford Harbor, New Bedford & Fairhaven, Massachusetts

October, 2000

DOLAN RESEARCH, INC.

DIVING SAFETY PLAN

Project Title: Phase Ib Field Testing and Evaluation of Two Remote Sensing Targets (27:196 & 66:161), New Bedford Harbor, New Bedford, Massachusetts

Contract Number: DACW33-94-D-0002 Task Order No. 0017 New Bedford Superfund Site OU #1

Operations:

Date of Dive: October or November, 2000

Location: Acushnet River, New Bedford Middle Harbor

Purpose of Dive: Diving will be conducted to identify and archaeologically assess two magnetic remote sensing targets located in New Bedford Harbor. The magnetic remote sensing targets are located at in the middle portion of the harbor.

Underwater Work: (1) Divers will conduct a visual examination of the bottom surface to identify any exposed features and or mark (buoy) the location of the magnetic anomalies.
(2) Hand-held probes may be used to identify the depth of the sediment over any buried magnetic anomalies or buried portions of wreck sites.
(3) If necessary, to identify and assess anomalies, target source may be exposed using hand-held water-powered induction dredges or jet probes.
(4) General measurements of the structural aspects of each site may be recorded using tape measures and UW slates.
(5) Exposed portions of any cultural resources may be documented using basic underwater mapping techniques, UW photography and UW video (conditions permitting).

Proposed Dive Sequence: Although subject to change accordingly to weather considerations, the project staff proposes to identify Target *27:196* first and then move over to Target *66:161*.

Conditions in Diving Area:

Water Depth: 7 to 25 feet; sand, gravel, & mud bottom
Maximum Bottom Time: 70 minutes with minimum 75-minute surface interval.
Visibility: Two to five feet (depending on conditions)
Water Temperature: 45 to 55 degrees
Maximum Currents: Less than 1-knot currents during normal flow conditions. Dive operations will not be conducted if currents exceed 2-3 knots.

Diving Techniques:

Type of Dive: Tethered surfaced-supplied air with hard wire voice communications. A Superlite 17b diving helmet w/ dual exhaust attached will be used by divers. All diving will be conducted from the dive platform of a 32-foot aluminum workboat, Cyprinodon. The investigation will have a 4-man dive team at a minimum. After anchoring directly over the remote sensing target location, a weighted down line will be established off the stern of the platform. After entering the water at the stern of the platform, a tethered diver equipped with hard wire communications will descend on the downline to the bottom to begin archaeological work. At the completion of each dive, the diver will return to the surface via the downline and exit the water by a five-step ladder at the stern of the dive platform.

Special Procedures: Standby diver suited up and equipment ready. Dive Supervisor will have constant communications with the diver. Dive Supervisor will direct all aspects of dive operations and safety procedures.

Equipment:

Individual Equipment: (1) 2 HP 300 c.f. air bottles with independent high volume regulators connected to a HP air manifold with Pneumo gauge (2) 1 150' diving umbilical (3) 1 surface- supplied diving helmet (Superlite 17B) (4) 1 two-way hard wire surface to diver communications radio (5) Viking HD vulcanized rubber dry suit with gloves and Superlite-17b neck sealed collar (6) 1 30 cubic foot bail out bottle w/ scuba regulator

Dive Platform: A 32-foot aluminum workboat, Cyprinodon, with cabin, VHF radio, and cellular phone. The dive platform will be anchored immediately over the dive site and U.S. Coast Guard approved dive flags will be prominently displayed from the vessel.

Air Supply: 4 HP 300 c.f. air bottles with independent high volume regulators connected to a HP air manifold with Pneumo gauge, and bailout tanks. Tanks will be filled at a professional dive shop. The Dive Supervisor will verify that the dive shop's air compressor has been inspected and air quality certified according to OSHA Air Certification for Diving Standards (29 CFR 1920.430 (B). Dive tanks will also be inspected by the dive master to ensure they have been visually inspected with in the last year and have been hydrostatically tested within the past five years.

First Aid Equipment: Industrial Grade First Aid Kit including DAN Oxygen Kit and four-man backboard.

Other equipment: Dive Flags, Communications System, tapes, slates, hand-held probes, water jet-probe, and 4-inch venturi dredge.

Note: If for any reason the dive plan is altered in mission, depth, personnel, or equipment, the USACE Command Diving Coordinator (UDC) at the district level shall be contacted in order that he/she may review any revision prior to actual operation.

Personnel:

Mark Klein, Dive Master/Supervisor (Hudson Engineers). Mr. Whall is a licensed commercial hard- hat diver and a certified SCUBA instructor with over 14 years of active commercial diving experience. Mr. Klein has extensive experience in all types of diving activities including engineering inspections, archaeological investigations and construction supervision. Mr. Klein has 40 hours of Hazwoper training.

Paul Kelley, Main Diver (Hudson Engineers) Mr. Kelley is a certified ANSI/ACE commercial diver with over 5 years of active dive experience. He specializes in underwater construction, salvage and masonry work. Also, Mr. Kelley currently serves in the U.S. Army National Guard as a specialist in charge of training, inspections, physical fitness and equipment maintenance. Mr. Kelley has 40 hours of Hazwoper training.

Lee Cox, Standby Tender/Decon person. Mr. Cox is an Underwater Archaeologist with over 20 years of active diving experience. Mr. Cox holds a PADI

Archaeological Research Diver and a Basic Diver certification. Mr. Cox has annually attended courses in First Aid and CPR for over 12 years. Mr. Cox has 40 hours of Hazwoper training.

* **Wes Hall, Standby Diver.** Mr. Hall is an Underwater Archaeologist with over 27 years of active diving experience. Mr. Hall holds a PADI Senior Advanced Diver certification. Mr. Hall has annually attended courses in First Aid and CPR for over 12 years. Mr. Hall has 40 hours of Hazwoper training

* potential project participant.

Copies of Physicals and Certifications are maintained at Dolan Research will be available for inspection prior to the start of any diving activities.

Predive Conference:

Safety Meeting and Operations Briefing: Before beginning diving operations in New Bedford Harbor an on-site safety meeting and briefing will be conducted. During the meeting safety issues will be discussed and emergency contingency plans laid out for all project members. All dive team members will be assigned a work task (i.e. Dive Master, Diver,. Safety Diver, Tender, and Emergency Response Coordinator) and made aware of the location of first aid and safety equipment including: fire extinguisher, first aid kit, O2 kit, throwable safety line, life jackets and back board. Emergency phone numbers will be displayed in a prominent place and will include the U.S. Coast Guard, police and rescue squad. Included with emergency phone numbers will be a map identifying the shortest route to the hospital or local doctor.

Predive Check: Prior to divers entering the water the Dive Master will check out each divers equipment and review safety procedures, underwater/ topside communications, and job task.

Medical:

First Aid: All personnel have been trained in first aid and CPR
Divers Alert Network (DAN): (919) 684-8111
Nearest Hospital : St. Lukes, 101 Page Street, New Bedford, MA (508) 997-1515
Nearest Hyperbaric Chamber Facility: U.S. Naval Submarine Base, Groton, Ct. (860) 694-3444. DAN will be called first.
Coast Guard and MEDIVAC: U. S. Coast Guard, 918 S. Rodney French Blvd. New Bedford (508) 991-6812
E.M.S., Police, etc.: 911

Environmental Conditions:

Water Conditions: Water visibility typically varies between 3 to 7 feet in the Acushnet River Water temperature in October is expected to range between 50 and 55 degrees. Current in the project vicinity typically is less than 1 knot.
Bottom Type: Sand, gravel, mud, and rock
Maximum Depth: 30 feet

Diving - Activity Hazard Analysis:

Listed below is the analysis of specific and general hazards that project members may encounter during this diving project or any diving contract or dive mission undertaken by Dolan Research. Prior to the start of any diving, this analysis will be reviewed by the Diving Safety Officer and/or Dive Master and the applicable hazards discussed with the project member or divers. Any applicable hazard not covered by this general analysis will be developed when the hazard is identified.

1. Hazardous chemical contaminates have been identified in New Bedford Harbor and are suspected to be carcinogenic to humans.

Risk Analysis: Known and or suspected pathways for contaminate are from the possible exposure to bottom sediments brought to the surface by the diver and not contained with appropriate decontamination procedures. These pathways include sedimentary film or mud left on the divers suit and can be transmitted to exposed skin and eyes of all personnel not protected from these contaminates. These include and not limited to the diver, tender and decontamination personnel and vessel crew.

Means of Prevention: A Site Control plan involving control zones for decontamination will be employed onboard the dive platform. This operation will have three work zones encompassed on the work vessel Cyprinondon. Do to the limited workspace only diving support crew personnel will be allowed in Zones 1 and 2.

1. Zone 1 encompasses the starboard side stern section of the vessel this area will be designated as the Exclusion/Contamination Zone. Only the diver and his tender will have access to this area.
2. Zone 2 encompasses the port side stern section of the vessel this area will be designated as the Contamination Reduction Zone and will have personnel used in the final decontamination of the diver. These will include the diver his tender, the diving supervisor and safety diver if needed.
3. Zone 3 encompasses the remaining areas of the vessel. This area is to be designated the Control Area or Support Clean Area. This area will be for vessel crewman and non-essential support personnel and government officials. No personnel in this area will be allowed into the adjoining areas without first checking in with the Diving Supervisor and without first dressing for appropriate contamination levels.
4. Standard Operating Procedures will be based on the Dolan Research Safe Diving Manual and site safety plan.

Decontamination Procedures: All personnel and equipment exiting the Exclusion/Contamination Zone must be decontaminated before entering into the Support/Clean zone. This decontamination must be preformed in order to prevent contamination from being transferred into clean areas and contaminating or exposing unprotected personnel. Decontamination procedures will be monitored by the Site Safety Supervisor to determine their effectiveness.

1. Diver in Water Decontamination: Diver while still in water will be staged at 5 feet below the surface with a wash down hose. The diver will wash off any visible sediment from suit before breaking the surface of the water. Before climbing up ladder into the Exclusion Zone.

2. From here, the diver will step into a 5' round plastic containment pool where the tender will begin decontamination of the diver. This will incorporate removal of the divers harness, bailout bottle and hand tools. These items then will be placed into a 35 gal. Canister for decontamination.

3. The diver will then inflate his suit to maximum fullness and leave his diving helmet on. The tender will begin to wash down the diver. This will be accomplished with the use of a wash mop and a solution of 25% water and 75% simple green washing detergent.

4. After the tender has scrubbed down diver with the detergent. A spray rinse of fresh clean water will be administered to the divers suit and helmet, making sure to rinse away all soap or sediment found on the diver's suit and helmet.

5. Once the rinse down is complete, a second wash and rinse will be administered, and the tender will ready the diver for entering the Contamination/ Reduction zone.

6. The tender will then remove the outer set of gloves from diver and place them into a plastic bag for further use later.

7. The tender will then assist the diver into the Contamination/reduction Zone.

Decontamination of the tender will begin with a rinse down to remove any contamination spread to the tender. The tender will then remove his outer gloves and assist diver into the Contamination Reduction Zone for final Decontamination.

Contamination /Reduction Zone Decontamination

1. The tender will assist the diver into a second 5' ft containment pool where a third and final rinse of the diving suit and helmet will be performed.

2. The tender will then dry the divers suit and hat with a towel and prepare for removal of diving helmet.

3. Removal of helmet will be at the diving supervisor's orders. At these order's the tender will unlock helmet from the diver and remove the helmet from the divers head. The tender will then put the helmet into a clean plastic bag to prevent contaminating the helmet.

4. The tender will then remove the inner set of gloves from diver and place them in plastic bag. After the Diving Helmet and gloves are removed, the tender will then prepare to remove the diving suit. Again, this will be at the diving supervisor's orders.

5. The tender will then assist the diver to a clean area in the Reduction Zone where the removal of the suit will be accomplished and the suit is staged on clean plastic. The diver will then be assisted by vessel personnel into the Support Clean Zone for monitoring. Tender then removes his PPE gear and enters the Support clean Zone for monitoring also.

Decontamination of Diving Equipment

1. All equipment is to be cleaned in the Exclusion Zone with the use of the detergent solution and clean water and will be placed into each Zone through the use of clean plastic bags.

2. All disposable materials such as gloves, protective suits, tape, towels etc., will then be placed into clean plastic bags and double bagged and sealed with tape and will be disposed as to correct disposal procedures.

3. Disposal of spent water is to be washed over the side of vessel and back into the harbor.

2. General Dive Conditions Specific to the Acushnet River:

HAZARD	MEANS OF PREVENTION	ACTION IN CASE
Loss of control due to strong currents.	No Diving in currents exceeding 2 knots. Constant communication with divers.	Trail 150' safety line from dive platform with buoy or life ring. Quick release on pickup boat.
Commercial Traffic	No diving if large barge/boat traffic is approaching. Maintain VHF radio contact with boat captains.	Recall divers to boat

3. General Diving Hazard Analysis

HAZARD	MEANS OF PREVENTION	ACTION IN CASE
Drowning	Adequate training, periodic drill in emergency procedures, utilize proper equipment and assure that it is in good condition. Scuba divers shall wear buoyancy compensators. Utilize only competent tenders and standby divers. Utilize the appropriate craft for safe dive staging and access. Topside support personnel must wear PFD when applicable.	Administer CPR as appropriate & seek medical help immediately.
Air Embolism	Assure divers are in good physical condition with no lung disorders. Do not dive when congested by hay fever or colds. Maintain proper training in diving physics and physiology, and maintain familiarity with the breathing equipment being used and always breathe normally. Emphasize the possibility for accidental inflation of BCs and the appropriate reaction.	Recompression in recompression chamber by trained personnel.
Decompression Sickness	Adhere to proper decompression tables. Get adequate sleep and no alcohol the night prior to the dive. Maintain good physical condition and use proper equipment for heavy or cold work.	Restore breathing, when necessary administer oxygen and stop bleeding when present
Hypoxia	Proper air quality testing of compressors. Do not use air that has been stored in cylinder for extended periods of time.	Surface diver and provide fresh air and/or oxygen.

C02 Excess	Assure adequate air supply. Breathe normally.	Surface diver and provide With fresh air.
Carbon Monoxide Excess	Assure proper maintenance and/or operation of air supply. Assure isolation of intake from exhaust on petroleum driven compressors.	Surface diver and provide with fresh air.
Strangulation	Do not dive with obstructive objects in mouth such as dentures, gum, tobacco or candy.	Surface diver and relieve the cause if necessary by Abdominal thrust back blows, or chest thrusts.
Squeeze	Be knowledgeable of the many type of squeeze and the ways to avoid them through equalization of pressure. Section 1.6.8 (sinus, lung, body, mask, suit).	Refer to Navy Dive Manual for treatment.
Blowup	When using inflatable suits, assure proper adjustment of air control & exhaust valve. Wear all gear appropriately.	Observe diver, recompress if symptoms occur.
Fouling or Entanglement	Study the dive area and anticipate possible obstructions to be encountered. Divers on umbilical or tethers should orient themselves to avoid circling an obstruction.	Standby or buddy diver assist in clearing foul. Bail out only if necessary, if so buddy breathe or utilize octopus to surface. Monitor downtime to determine if recompression is needed.
Falling Objects	Secure all topside objects that may accidentally fall on the diver. Diver should remain topside while hoisting equipment is being used overhead in the diving area. When utilizing hoisting in support of a specific dive, diver must stay in direct voice contact with the hoist operator. Handle tools and equipment carefully and assure compliance with SAFE CLEARANCE PROCEDURES.	Apply first aid or other appropriate treatment.
Overexertion or exhaustion	Divers should know individual limitations and stay within them. Stop and rest before becoming exhausted. Maintain and use the proper equipment.	Assist diver in exiting the water, provide rest and warmth.
Hypothermia	Dress appropriately for U/W temperature (wetsuit or drysuit). Limit bottom time in extreme cold water to avoid unnecessary discomfort or loss of reflexes.	Keep diver in surroundings and supply with liquids until body temperature becomes normal.

		Medical assistance may be necessary.
Current	Check for leakage prior to diving above or below gates, bulkheads, valves, etc.., and be assured that SAFE CLEARANCE PROCEDURES are in effect. In normal currents, always use a line when currents exceed 1 knot.	N/A

4. General Work Analysis:

HAZARD	MEANS OF PREVENTION	PROBLEM AREAS
Work site	Limit or prevent access as necessary. In open waters notify Coast Guard of the diving activity and always fly the dive flag and/or alpha flag. Maintain radio communication via VHF marine radio.	Commercial vessels and pleasure boats.
Accident Prevention	PFD, proper clothing and safety equipment as required by EM385-1-1. Warning signs, barricades or other applicable warning devices a required by EM385-1-1.	Public and personal injury
Emergencies, Injuries and Accident Reporting	Maintain certification of divers in both CPR & First Aid. Maintain first aid kits & resuscitators. Post or otherwise provide all personnel with emergency phone numbers. Promptly investigate and report all accidents.	Public and personal injury
Machinery and Mechanized Equipment	All machinery end equipment and the operation thereof will be in strict accordance with the requirement of EM385-1-1, Section 18.	Equipment damage, property damage, public and personal injury.
Vehicle Operation	Drivers will obey all speed limits and other highway signals. Vehicle should be operated in strict accordance with the requirements of EM385-1-1, Section 19.	Equipment damage, property damage, public and personal injury.
Loading & off loading equipment	Stand clear of loads being moved mechanically. If handled by hand, know your capabilities and do not exceed them. Assign the proper number of people to do the job. Lift properly to avoid back injury. Clear	Equipment damage, property damage, public and personal injury.

	path of tripping hazards.	
Water access or work adjacent to water	All floating plant marine work will be performed in strict accordance with the requirements of EM385-1-1, Section 19. Work adjacent to water will require compliance with provision of EM385-1-1, applicable to the specific site and/or circumstances.	Drowning, falling or slipping.